



THE OHIO STATE UNIVERSITY



Dietary Adequacies of Maternal-Child Pairs in León, Nicaragua in Relation to Food Insecurity

Honors Thesis

**Presented in Partial Fulfillment of the Requirements for graduation “with Honors
Research Distinction in Anthropological Sciences” in the undergraduate colleges of
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Introduction

Food insecurity is defined as, “a state when people lack physical, economic or social access to sufficient amounts of food to meet their dietary intakes and food preferences for a healthy lifestyle” (FAO, 2012). With approximately 1 billion people (1 in 7) world-wide suffering from lack of adequate access to food, food insecurity and accompanying maternal-child malnutrition remain critical health issues in communities around the world in both developed and developing settings.

The causes, or pillars, of food insecurity include: inadequate availability due to low productivity, limited access to available food, usually due to poverty, reduced utilization which includes compromised food safety, poor food choices, and the limited ability to extract nutrients from food sources due to poor health and instability (Hadley and Crooks, 2012). Globally, limited access, due to poverty, is one of the most critical predictors of food insecurity. Chronic exposure to food insecurity is associated with many ill effects on adults and children, such as poor fetal growth and neurological development, low birth weight, increased risk of infection, and poor growth and cognitive development in childhood. Food insecurity also has an effect on mental health. Mental health is a relatively unexplored realm of study in relation to food insecurity, but it has been hypothesized that factors such as uncertainty in the household regarding food, lack of micronutrients in the diet, and sensitivities to inequalities in diets may have correlations to anxiety and depression amongst individuals and families suffering from food insecurity (Chilton et al., 2007; Weaver and Hadley, 2009). Together, these consequences of food insecurity undermine individual well-being, societies’ productivity, and the ability to break the intergenerational cycle of poverty (Chilton et al., 2007; Cole and Tembo, 2011; Merchant and Kurz, 1993; Walker et al., 2007; Weaver and Hadley, 2009). Thus, by improving nutrition

worldwide, people will be better able to experience a higher quality of life in terms of overall physical health and mental well-being.

In response to the global epidemic of poverty, the United Nations (2011) implemented the Millennium Development Goals (MDG) in 2000 in an attempt to methodically eradicate major global public health and economic issues. The goals drafted by the United Nations aim to improve overall human health and well-being. The first Millennium Development Goal is to eradicate extreme poverty and hunger. However it could be said that other goals, such as reducing child mortality, improving maternal health, and improving environmental sustainability, also relate to food insecurity because food insecurity is a precursor for these problems (UN, 2000).

Food insecurity has long been an issue tackled by nutritionists and economists. These studies have examined the types and quantities of foods consumed, and the economic perspective illustrates the larger impact of policy on food insecurity (Gittelsohn, 1997; Gittelsohn, 1991; Horner et al., 1981; Kaiser and Dewey, 1991; Haddad et al., 1997). However, the anthropological perspective utilizes ethnographic methods to not only understand the dietary and economic landscape, but to also understand the personal and community experiences with food scarcity. The important topics anthropology focuses on in regards to food insecurity are 1) the cultural value of food 2) how food insecurity debilitates the agency and productivity of women and children, 3) intrahousehold effects on food insecurity 4) gender and power structure/roles in the home and 5) the value placed on children and strategies designed to value children (such as preferential feeding). Food insecurity not only affects women and children detrimentally in a biological sense, but it also contributes to the cultural undermining of their status in society. Gender discrimination is an integral part of Nicaragua in aspects of the *machismo* culture.

Machismo is the idea that men are the stronger, more favored gender, and their authority trumps that of the woman in almost all social contexts. William Harvey states in his paper about women and their roles in Nicaragua:

“Although machismo is often viewed as primarily sexual in origin and outward manifestation (Liebman 1975), many see it as being far more pervasive. It is recognized not only in the traditional sexual dominance of the male, and in the corresponding passivity of the female, but also in a wide variety of economic, social, and political contexts” (Williams, 1986).

It is believed beyond the sexual aspect of *machismo*, that men are superior to females in almost every manner, including intellectual prowess. Men are viewed also as more responsible and more capable of sociopolitical ideals. Men are also viewed as morally superior. These ideals are not only ingrained in social roles (younger men for example, are given authority over older females in the household), but are also supported by larger social institutions. The Catholic Church defends these gender differences, and even women support these assumptions.

Because of these cultural constraints, when food insecurity affects women and children, women resort to coping strategies to fend off hunger. Research has demonstrated that in response to food insecurity, households adopt a series of coping strategies which include: reducing food variety, limiting portion sizes, meal skipping and the preferential feeding of some household members over others. Coping strategies are defined as a “short-term response to an immediate and inhabitual decline in access to food (Davis, 1996; Hadley and Crooks, 2012)”. While coping strategies often start out as short term fixes, it has been shown that because there are limited

additional options to deal with food insecurity, households have to apply these short-term coping mechanisms for long-term food scarcity issues (Hadley and Crooks, 2012).

The preferential feeding of some household members over others has been reported in a number of studies (*see* Haddad, 1996 *for a review*). In some cases, more economically active members of the household, such as adult men, are given greater access to nutrient-dense foods such as meats, vegetable and fruits (Engle and Nieves, 1993; Gittelsohn, 1991). In other cases, members perceived as being more vulnerable, such as children, are prioritized at mealtimes. In one study examining the Nuñoan population of the Peruvian highlands, it was found that children, as a group, were subject to far less seasonal food stress than adults, and that adults protected children from hunger by preferentially allocating food to children (Leonard, 1991). However, in general, women and children are viewed as being the most vulnerable to suffering food insecurity due to their lower social status in the home and their greater biological needs (Gittelsohn, 1991; Pelto, 1987; Torun et al., 1996). This is important, as mothers are often the first to report reducing their own intakes in an effort to allocate scarce food resources to their children due to their primary roles in food production, preparation and distribution in the home (Handa, 1996; Kennedy and Peters, 1992). This phenomenon has been referred to as “maternal nutritional buffering”. In practicing nutritional buffering, mothers can reduce their portion sizes during meals, skip meals, or consume different kinds of foods than their children (Radimer et al., 1992; Fitchen, 1987; Piperata et.al., 2013; Kaiser and Dewey, 1991; Graham, 1997). For example, in Mexico, Kaiser and Dewey, (1991) identified household distribution patterns that tended to favor children over their mothers, and that seasonally, children received a more varied diet than mothers. In rural highland Peru, the quantitative caloric intakes for children were compared to ethnographic data examining local concepts of health and wellness, and it was

found that because children were considered to be especially vulnerable to disease if hungry, parents would buffer children to make sure the child avoided hunger and the potential for illness (Graham, 1997). Finally, a recent study was conducted amongst rural Amazonian mothers and children, where dietary data were collected over three days using the weighed-inventory method. The authors found that household food availability predicted the degree to which mothers were able to buffer their children from food shortages (Piperata et al. 2013). Beyond the few studies reviewed above, there is very limited data on the actual dietary intakes of mothers and children living in food insecure conditions, making it difficult to determine the degree to which maternal nutritional buffering occurs and its effectiveness in improving intakes among children in different contexts of food insecurity.

This thesis builds on the above cited literature by examining the dietary intakes of mothers and children living in a sample of poor urban and rural households in León, Nicaragua. As not all poor households are food insecure, the goal of this thesis is 1) to examine the energy and protein adequacies of the diets of matched-pairs of mothers and children 2) to identify differences in dietary adequacies between women and children by environmental context (urban versus rural) and food security statuses (food insecure versus food secure) and 3) to identify evidence of maternal nutritional buffering and how this is affected by the cultural context of Nicaragua.

Specific hypotheses this thesis examines are:

- 1) What are the dietary adequacies of mothers and children in León, Nicaragua?
 - a. Are the dietary intakes of mothers and children in poor urban households more adequate than of those in rural contexts? *Considering that access to*

resources is greater in urban contexts and poverty rates were higher in rural zones, I hypothesize that dietary adequacies will be greater among mothers and their children in urban households.

- b. Are the dietary intakes of mothers and children living in poor, food secure households more adequate than those of mothers and children living in poor food insecure homes? *If perceived food insecurity is related to actual food availability in the household, then I hypothesize that energy and protein adequacies of mothers and children would be higher in food secure versus food insecure households.*

2) Is there evidence of maternal nutritional buffering?

- a. Is there greater evidence of **maternal nutritional buffering** in food insecure households compared to food secure households? *Since maternal buffering is a recognized coping mechanism for dealing with food insecurity, I hypothesize that maternal buffering (i.e. the diets of children will be more adequate than maternal diets) will be greater in food insecure compared to food secure households.*

Background

Site Location and Description

Nicaragua, located in Central America (Figures 1 and 2) has a population of approximately five million people, (WHO, 2012) and contains many varied environments, including tropical rainforests, dry coastal zones and arid mountain ranges (CIA World Factbook, 2014). It is also rich in natural resources. Nicaragua exports many different products, including cacao, coffee, and peanuts (CIA World Factbook, 2014). Despite being rich in natural resources and exporting food crops, Nicaragua is considered the second poorest country in the Western Hemisphere. Approximately 45% of the population lives on less than US \$1.00 per day (USAID, 2005). Half of the population identifies as being poor and 17% consider themselves extremely poor (Peña et al., 2008). Even with a dramatic 50% increase in grain production between 1994-2002 and a significant amount of rich, arable land, high rates of food insecurity persist, indicating that access to and utilization of food, rather than low food production, are driving food insecurity in the country. USAID (2005) estimates that 29% of the Nicaraguan population is under-nourished and that access to micro-nutrient rich foods is limited (Contreras and Ekström, 2008).

Rural areas in Nicaragua experience greater poverty than urban areas. The estimated rate of poverty in rural areas is 70% while 30% of the urban population is considered poor. Women and children suffer disproportionately from poverty. Twenty percent of children under the age of five show severe nutritional deficiencies related to inadequate consumption of protein (kwashiorkor) and inadequate consumption of carbohydrates and other macronutrients (marasmus) (Peña et al. 2008). Women face many reproductive health issues because of

malnutrition such as poor pelvic bone growth, vitamin deficiencies, and increased risk of anemia (Merchant and Kurz, 1993). Malnutrition also negatively impacts children and is the primary underlying cause of child deaths each year in Nicaragua (PCIGlobal, 2014). These two populations therefore are directly affected by nutritional issues and food security in Nicaragua.

The site of the study is León (Figure 3), located in the central Pacific region, approximately 90 kilometers from Managua, the national capital. León is the second largest city in Nicaragua, with a physical area of about 820 km², and a population of 176,915 residents (Peña et al. 2008). León is home to the original campus of the Universidad Nacional Autonomidad de Nicaragua (UNAN), and currently houses the medical campus of UNAN. León is divided into three zones, Perla, Mantica, and Sutiava. All three zones include both rural (Figure 4) and urban (Figure 5) areas.



Figure 1. Map of Nicaragua in relation to North America

http://www.cbnicaragua.com/where_is_nicaragua.php



Figure 2. Map of Nicaragua in Central America

<http://www.lonelyplanet.com/maps/central-america/nicaragua/>

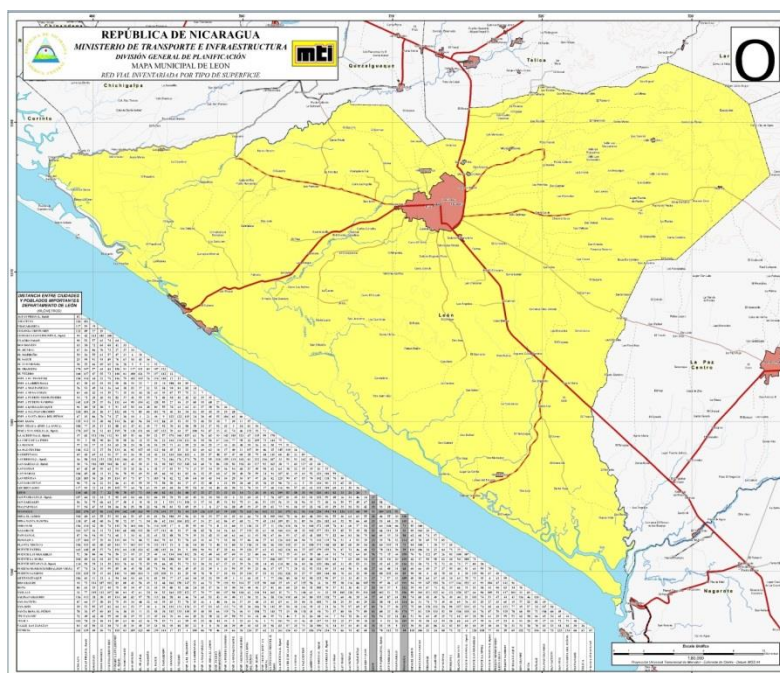


Figure 3. Municipality map of León, Nicaragua [http://www.armadillo-](http://www.armadillo-nicaragua.com/Maps.php)

[nicaragua.com/Maps.php](http://www.armadillo-nicaragua.com/Maps.php)

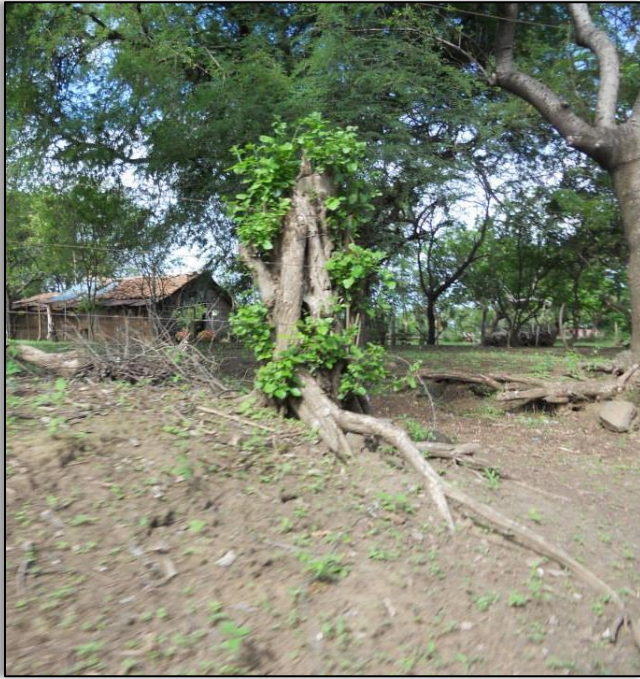


Figure 4. Rural León. Photo credit: Thara Nagarajan



Figure 5. Urban León. Photo credit: Thara Nagarajan

Description of Sample

In 2012, a sample of 500 households with young children (aged 3-11) was randomly selected from a representative sample of households in both urban and rural zones of León. These 500 households were administered the ELCSA survey to determine the experiences of food insecurity within the home. In 2013, this 500 household sample was narrowed to 107 by including only the poorest quartile, thus controlling for poverty in the 2013 study. Here I report data on a sub-sample of 41 of these 107 households (Urban n = 16; Rural n=25). The data reported here were collected in June through September, 2013, corresponding to the wet season when food availability is considered to be the highest.

Household Characteristics

In the sample of 41 households, the average age of the mothers was 32.4 years and the average age of the focal child was 7.6 years. Fifty-six percent of the mothers in these 41 households worked outside the home and 74% were married or cohabitating, while 7.7% were single, female-headed households. Typical forms of employment for women in the sample included running a *pulperia* (a small family owned, in-house or near the house grocer, selling snacks, beverages, and other cheap, calorie-dense foods- similar to a convenience store in the United States), working as caretakers, maids, or traveling to work in one of the many factories located in the *Zona Franca* (free trade zone).

Due to high rates of poverty, it was common for multiple generations to live together in single household complexes. Thus, in many households, young children received care from multiple individuals including grandmothers and older siblings, especially older sisters. When

mothers worked outside the home, these alternate caregivers assisted with housework, including the preparation and distribution of food.

Methods

Data Collection

Dietary Intakes of Mothers and Children

Dietary data were collected using the 24-hour dietary recall method (Gibson, 1990) over a 3-day period. On each of the three days, a researcher, fluent in Spanish, visited the home and conducted the 24-hour dietary recall with the mother and any other individuals within the home who prepared food and/or provisioned the focal child. The mother and/or individual who prepared the food was specifically asked to recall the foods prepared and consumed at breakfast, mid-morning, lunch, mid-afternoon, dinner and in the evening over the previous 24-hr period. The interview was conducted in three parts: (1) all foods prepared and consumed within the home, (2) foods consumed by the mother and (3) foods consumed by the focal child. When the child was of school age they were included in the interview in effort to gather information on any foods consumed outside the home (e.g., at school, street foods). These data (type of food and estimated amount) were recorded on pre-made 24-hr recall forms specific to the household, mother and child (see Appendix A for sample forms).

- (1) Due to the fact that the project was focused on understanding the dietary adequacies (quantitative data) of mothers and children and that the 24-hr recall method alone is insufficient for gathering such data, the method was enhanced by conducting the procedures that follow. During the 24-hr recall interviews, the interviewers used a series of serving spoons which included a flat serving spoon, a metal ladle, a

tablespoon, a teaspoon, and a soup ladle (Figure 6) and containers (graduated cups, bowls) which allowed informants to identify with greater precisions the quantity of all ingredients used in all prepared recipes, as well as amounts consumed of all recipes and beverages. For individual items such as tortillas, pieces of meat, cheeses, fruits and vegetables, the interviewer inquired about the size of the item, in some cases using a ruler (e.g., length, circumference, relative size (small, medium, large)) and/or its cost at the market). These data were reported on the 24-hr recall forms (Appendix A).



Figure 6. Examples of Nicaraguan spoons used to measure food portions in this study. Photo credit: Thara Nagarajan

- (2) To convert the serving sizes to actual weights, a local woman was hired to prepare the commonly consumed dishes (recipes). Sample weights of a spoonful of a dish using the various serving utensils/containers mentioned above were collected for the prepared dishes and average values were entered into the nutrition program (see details below). To estimate the weights of the individual foods, we visited the market and purchased the described items and then weighed them. Again, average values were entered into the nutrition data base.
- (3) To calculate the nutritional value of the foods and beverages consumed, we used the Nutritionist Pro Software Program (version 5.2). As most Nicaraguan foods were not included in the software database, nutritional information was gathered from the Tabla de Composición de Alimentos de CentroAmérica compiled by the Instituto de Nutrición de Centro América y Panamá (INCAP) and entered into the Nutritionist Pro Database. We then entered the recipes and individually served portions into the program and it calculated the kilocalorie, carbohydrate, protein and fat composition of all food items and recipes consumed.

Food Security

To measure household food insecurity, the Escala Latino Americana y Caribeña de Seguridad Alimentaria (ELCSA) was administered to the mother. This instrument consists of 15 questions regarding experiences with food insecurity. The questions range from concerns regarding running out of money to purchase food and reducing dietary diversity at the household level, to the coping strategies adults and eventually children employ under conditions of food

scarcity (Table 1). The instrument was face-validated in 2012 as part of the broader study of the 500 households discussed above.

Table 1. Food Insecurity Questionnaire (in English and Spanish)

Pregunta (en Español)	Question (in English)
1. En los últimos 3 meses, por falta de dinero u otros recursos, ¿alguna vez usted se preocupó porque los alimentos se acabaran en su hogar?	In the past 3 months, due to lack of money or other resources, have you ever worried you would run out of food?
2. En los últimos 3 meses, por falta de dinero u otros recursos, ¿alguna vez en su hogar se quedaron sin alimentos?	In the past 3 months, due to lack of money or other resources, were you ever left without food?
3. En los últimos 3 meses, por falta de dinero u otros recursos, ¿alguna vez en su hogar dejaron de tener una alimentación saludable?	In the past 3 months, due to lack of money or other resources, did you lack a healthy diet?
4. En los últimos 3 meses, por falta de dinero u otros recursos, ¿alguna vez usted o algún adulto en su hogar tuvo una alimentación basada en poca variedad de alimentos?	In the past 3 months, due to lack of money or other resources, have you or any adult in your household had a diet based on a poor variety of foods?
5. En los últimos 3 meses, por falta de dinero u otros recursos, ¿alguna vez usted o algún adulto en su hogar dejó de desayunar, almorzar, or cenar?	In the past 3 months, due to lack of money or other resources, have you or any adult in your household gone without eating breakfast, lunch, or dinner?
6. En los últimos 3 meses, por falta de dinero u otros recursos, ¿alguna vez usted o algún adulto en su hogar comió menos de lo que debía comer?	In the past 3 months, due to lack of money or other resources, have you or any adult in your household eaten less than they should eat?
7. En los últimos 3 meses, por falta de dinero u otros recursos, ¿alguna vez usted o algún adulto en su hogar sintió hambre pero no comió?	In the past 3 months, due to lack of money or other resources, have you or any adult in the household been hungry but did not eat?
8. En los últimos 3 meses, por falta de dinero u otros recursos, ¿alguna vez usted o algún adulto en su hogar solo comió una vez al día o dejó de comer durante todo un día?	In the last 3 months, due to lack of money or other resources, have you or an adult at home eaten only once a day or didn't eat for a whole day?
9. En los últimos 3 meses, por falta de dinero	In the past 3 months, due to lack of

u otros recursos, ¿alguna vez algún menor de 18 años en su hogar dejó de tener una alimentación saludable?	money or other resources, has anyone in the home under the age of 18 been unable to have a healthy diet?
10. En los últimos 3 meses, por falta de dinero u otros recursos, ¿alguna vez algún menor de 18 años en su hogar tuvo una alimentación basada en poca variedad de alimentos?	In the past 3 months, due to lack of money or other resources, has anyone under the age of 18 in your household had a diet based on little variety of food?
11. En los últimos 3 meses, por falta de dinero u otros recursos, ¿alguna vez algún menor de 18 años en su hogar dejó de desayunar, almorzar o cenar?	In the past 3 months, due to lack of money or other resources, has anyone under the age of 18 in your household gone without eating breakfast, lunch or dinner?
12. En los últimos 3 meses, por falta de dinero u otros recursos, ¿alguna vez algún menor de 18 años en su hogar comió menos de lo que debía?	In the past 3 months, due to lack of money or other resources, has anyone under the age of 18 in your household eaten less than they should?
13. En los últimos 3 meses, por falta de dinero u otros recursos, ¿alguna vez tuvieron que disminuir la cantidad servida en las comidas a algún menor de 18 años en su hogar?	In the past 3 months, due to lack of money or other resources, have you ever had to decrease the amount served at meals to a child under 18 in your household?
14. En los últimos 3 meses, por falta de dinero u otros recursos, ¿alguna vez algún menor de 18 años en su hogar sintió hambre pero no comió?	In the past 3 months, due to lack of money or other resources, has anyone under the age of 18 in your household felt hungry but did not eat?
15. En los últimos 3 meses, por falta de dinero u otros recursos, ¿alguna vez algún menor de 18 años en su hogar solo comió una vez al día o dejó de comer durante todo un día?	In the past 3 months, due to lack of money or other resources, has anyone under the age of 18 in your household only eaten once in a day OR went without eating for the entire day?

Data Analysis

Dietary intake. Detailed dietary data were converted to total energy (kcal), protein (g), carbohydrates (g) and fat (g) using the Nutritionist Pro (version 5.20) software program. Since most of the foods consumed were not in this North American database, nutritional data on the Nicaraguan Foods were obtained from the TABLA DE COMPOSICION DE ALIMENTOS DE CENTROAMÉRICA (INCAP) consolidated by the *Instituto de Nutrición de Centro América Y*

Panamá (INCAP) and entered into the Nutritionist Pro program. First, all Nicaraguan foods weighed and/or measured were entered into Nutritionist Pro to build a Nicaraguan Foods database. Caloric values per 100 grams, taken from the *INCAP* database, were then entered into Nutritionist Pro. Once all individual ingredients were entered into the database, all individual recipes were entered into the program in order to calculate their macronutrient (carbohydrate, protein, and fat) composition and their total energy (kcal). To calculate the intakes (macronutrient and energy) of the women and children, the portions of the individual food items and/or recipes each of them consumed was entered into the program.

Once all recipes and foods were entered for the individual over the three day span, the three day average for energy (kcal) and protein (g), were calculated. Here, I focus on the average energy and protein intakes.

Food security. Households' food security status was determined from the number of positive responses to the ELCSA instrument (Melgar-Quinonez & Hackett, 2008). Those who responded "no" to all questions were considered food secure. Mildly food insecure was defined as affirmative responses to 1-5 questions. A household was classified as moderately food insecure when answering "yes" to 6-10 questions and severely food insecure when answering affirmatively to 11-15 of the questions. In this study, households were grouped into two categories (food secure / mildly food insecure = yes to fewer than 6 responses; food insecure = yes to 6+ questions).

Dietary Adequacy

Mothers

Energy adequacy was defined as the average energy intake over a three day period divided by total daily energy expenditure multiplied by 100. Protein adequacy was defined as the average protein intake over a three day period divided by the recommended protein intake multiplied by 100. To calculate maternal total daily energy expenditure I first calculated each woman's basal metabolic rate (BMR) which required knowledge of her weight and age, which was collected as part of the study. This value was then multiplied by her physical activity level (PAL). The BMR equations, taken from the FAO (FAO, 2011; FAO, 1985), are listed below:

a) Women aged 18-30 years: $\text{BMR (kcal)} = 14.818 (\text{kg}) + 486.6$

b) Women aged 30-60 years: $\text{BMR (kcal)} = 8.126 (\text{kg}) + 845.6$

BMR was then multiplied by the woman's estimated PAL. We used a PAL of 1.6 which is considered light/sedentary physical activity (FAO, 2011) as none of the women in the study were involved in subsistence work. We recognize the limitations of this assumption as some women may have been more active than others. We consider this to be a conservative estimate of their energy needs. A woman was classified as having an energy and protein adequate diet if her energy and protein adequacies were greater than or equal to 100 (i.e., 100% of her needs). Values below 100 indicated inadequate consumption to meet requirements. Protein adequacy was calculated as the average protein intake over three days (g) divided by the recommended protein intake (g) multiplied by 100. The recommended protein intake was determined using the following equation:

a) $(\text{maternal weight (kg)} \times 0.75)$ (FAO, 1985)

Adequacy was defined as meeting or exceeding 100% of needs.

Children

Similar procedures were used to calculate the energy and protein adequacies of the children. Again, total daily energy expenditure was calculated as BMR*PAL. However, for children equations were more complex, as they considered age and sex (FAO, 2011).

Table 2 provides details on the equations used to calculate energy and protein requirements of the children in the sample. As with the mothers, adequacy was defined as meeting or exceeding 100% of one's requirements.

Table 2. Energy and Protein Requirements for Children.

Age group	Energy requirement (kcal/day)		Safe protein intake level (g)
3-5 years	1,550		17.5
5-7 years	Boys	Girls	21
	1,850	1,750	
7-10 years	Boys	Girls	27
	2,100	1,800	

These methods were used to answer the following research questions:

Question 1a: Are the dietary intakes of mothers and children in poor urban households more adequate than of those in rural contexts?

To examine differences in dietary adequacy among rural and urban contexts, we grouped households according to their regional location, examined dietary and protein adequacies, and compared dietary adequacies between them. Mothers and children dietary and protein adequacies were then analyzed using Students' matched-pairs t-tests to see if children had better energy and protein adequacies than that of their mothers.

Question 1b: Are the dietary intakes of mothers and children living in poor, food secure households more adequate than those of mothers and children living in poor food insecure homes?

To apply this data to food security status, dietary adequacies of women and children were correlated to their household's perceived food security status, as coded and described by the ELCSA questionnaire. Mothers and children were first grouped according to their food security status and then analyzed for dietary adequacies using independent t-tests.

Question 2: Is there greater evidence of maternal nutritional buffering in food insecure households compared to food secure households?

To elucidate buffering, an index was generated (mother adequacy—child adequacy) to give a numerical quantity for the occurrence of buffering. The greater the negative index, the larger the degree of dietary buffering was present in that mother-child pair. I then compared these differences using the above food security scores using independent-paired T-tests to find significance to whether food insecure households had higher occurrences of energy and protein buffering than those of food secure households.

The research protocol was approved by the OSU IRB (protocol number: 2012B0195) and the Universidad Nacional Autónoma de Nicaragua (UNAN).

Results

General Findings

Dietary Adequacies of Mothers and Children

Table 3 reports the average energy (kcal), and protein (g) intakes of the mothers and children in the sample, as well as their average energy and protein adequacies.

Table 3. Overall Intakes and Adequacies of all Mothers and Children.

	<i>Mothers</i>	<i>Children (aged 3-6)</i>	<i>Juveniles (aged 6-11)</i>
<i>Average kilocalorie intake</i>	1741.3	1268.0	1614.2
<i>Average protein intake (grams)</i>	49.9	36.4	43.6
<i>Average dietary energy adequacy (percent)</i>	80.1	90.1	87.7
<i>Average protein adequacy (percent)</i>	99.8	190.0	161.9
<i>% protein in the diet</i>	11.5	11.5	10.8

Food Security Status of Sample Households

Household-level food security status was assessed using the validated ELCSA instrument. Figure 7 reports the food security status for the sample households. Of the 41 households: 20% reported being food secure (0 affirmative responses), 26% were mildly food insecure (1-5 affirmative responses), 23% were moderately food insecure (6-10 affirmative responses) and 31% reported severe levels of food insecurity (11+ affirmative responses).

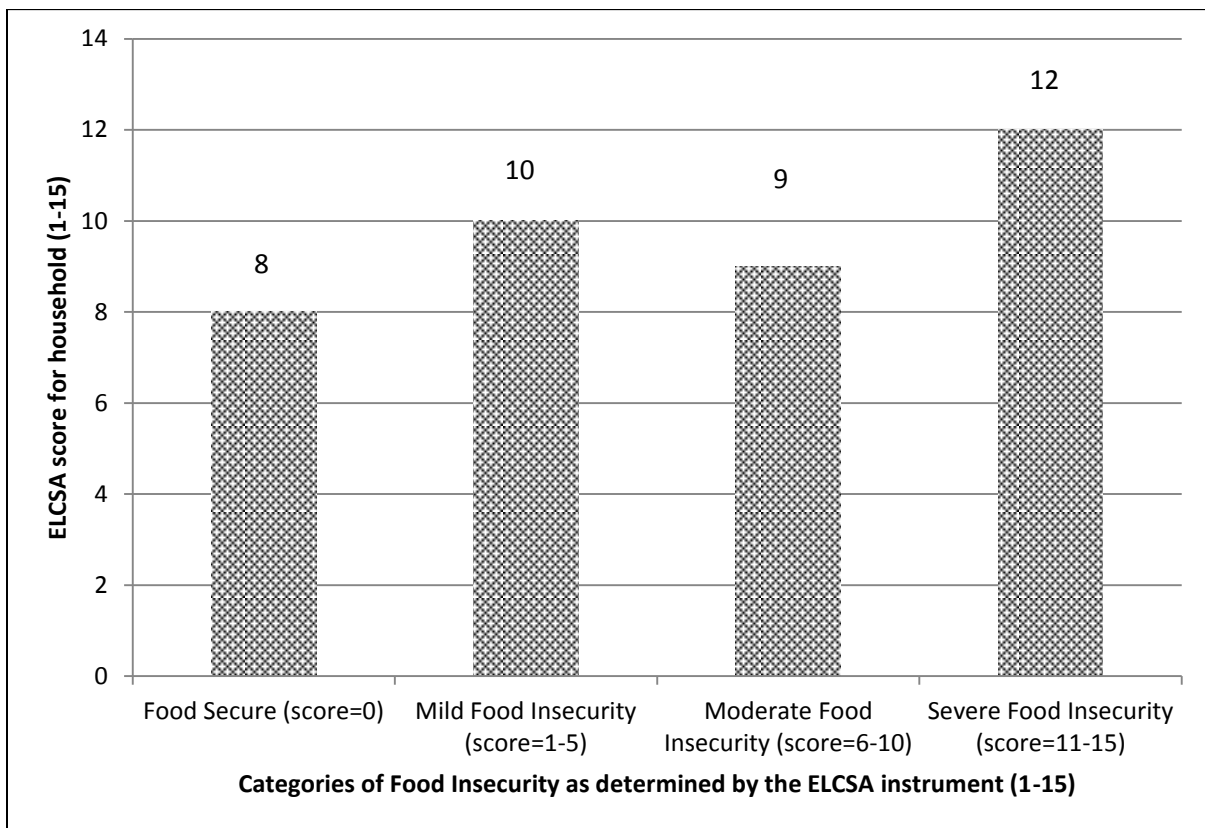


Figure 7. Food Insecurity Scores for Households

In comparing food security status by geographic context, a greater proportion of food insecure households were located in the rural compared to the urban zones of León (Figure 8).

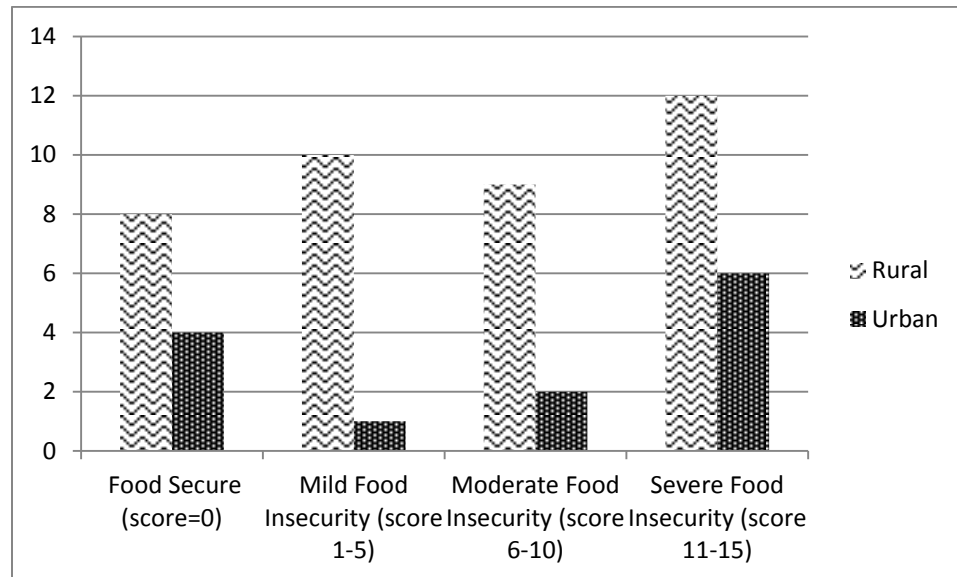


Figure 8. Food Insecurity Statuses (Urban versus Rural Contexts)

Differences in maternal and child dietary adequacies in urban and rural contexts

Research question (1a) asked if there were differences in dietary adequacies in urban versus rural households. I hypothesized that diet adequacies of both mothers and children would be higher in urban contexts due to greater food availability and higher economic status of urban households. Among the mothers, energy ($t=2.8$, $p=0.007$) and protein ($t=2.1$, $p=0.04$) adequacies were significantly higher in urban vs. rural contexts. For children, results were similar. In terms of energy, urban children had more adequate diets compared to rural children ($t=2.2$, $p=0.04$). However, there were no differences in protein adequacies between children living in urban versus rural contexts ($t=1.87$, $p=0.07$) (Table 4).

Table 4. Differences in Dietary Adequacies of Mothers and Children in Urban versus Rural Contexts

<i>Individuals/Regions</i>	<i>n</i>	<i>Average Energy Intake (kcal)</i>	<i>Individual T- Tests</i>	<i>Total Daily Energy Expenditure</i>	<i>Average Energy Adequacy (%)</i>	<i>Average Protein Intake (grams)</i>	<i>Average Protein Adequacy (%)</i>	<i>Individual T-Tests</i>
<i>Mother</i>	41							
<i>Urban</i>	16	1949.8	t=2.8, p=0.007	1989.6	98.3	59.4	123.4	t=2.1, p=0.04
<i>Rural</i>	25	1532.9		2241.1	68.4	44.7	87.9	
<i>Child</i>	41							
<i>Urban</i>	16	1662.9	t=2.2, p=0.04	1646.5	101.2	46.6	208.6	t=1.87, p=0.07
<i>Rural</i>	25	1416.2		1832.1	77.3	39.1	153.2	

Research question (1b) asked whether there was a significant difference in dietary energy and protein adequacies of mothers and children living in food secure vs. food insecure homes. I hypothesized that mothers and children in food secure households would have more adequate diets than those living in food insecure households due to higher household food availability in food secure homes. Contrary to my hypothesis, I found no differences in energy or protein adequacies between women and children living in food secure households versus food insecure households (Fig. 9).

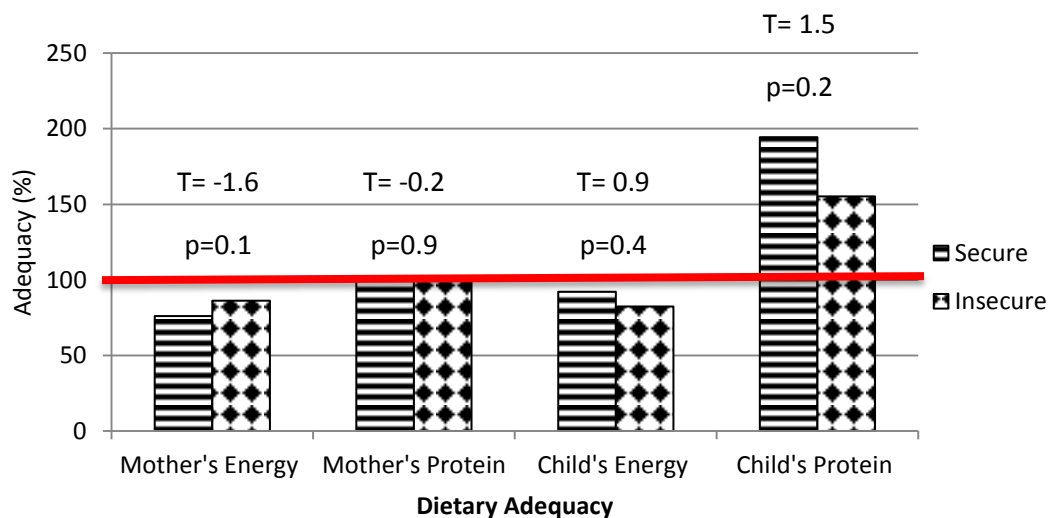


Figure 9. Dietary Adequacies of Mothers and Children in Food Secure versus Food Insecure Households

Evidence of Maternal Nutritional Buffering

Research question (2) asked if there was evidence of maternal nutritional buffering in this sample of poor, Nicaraguan households. Maternal nutritional buffering was defined as the condition where a child's dietary adequacy (energy and protein) exceeded that of its mother. Average differences in child and mother energy and protein intakes are reported in Table 5. Using paired

T-tests, energy and energy and protein adequacies of matched mother-child pairs were compared. In terms of energy, I found that children's diets were 6.5% more adequate than that of their mothers. In terms of protein, children's intakes were, on average, 72% more adequate than their mothers' intakes. Paired t-test results also illustrated that protein buffering was significant, as opposed to energy buffering between mother-child pairs (Table 5).

Table 5. Maternal-Child Adequacy (Mother–Child Adequacies)

<i>Types of Buffering</i>	<i>N</i>	<i>Mean</i>	<i>Standard Deviation</i>	<i>Paired T-tests</i>
Energy Buffering	41	-6.5	48.2	t= -0.9, p=0.4
Protein Buffering	41	-72.2	94.2	t= -4.9, p=0.000

Research question (2a) examined whether there was greater evidence of maternal nutritional buffering in food insecure households compared to food secure households. To determine if buffering was greater in food secure versus food insecure households, I divided the households into two dichotomous categories. The food secure and mildly insecure were grouped together (referred to as *food secure*) while the moderately and severely food insecure households were grouped together in the *food insecure* category. While not statistically significant, I found a greater tendency for energy buffering (i.e. children's intakes were more adequate than their mothers') in food secure households compared to food insecure households (t= -1.9, p=0.07) (Table 6).

Table 6. Maternal Nutritional Buffering in Food Secure versus Food Insecure Households

<i>Types of Buffering</i>	<i>Food Security Status</i>	<i>N=</i>	<i>Average Difference (Mother-Child)</i>	<i>Paired T-tests</i>
Energy Buffering	Secure	18	-21.9	t= -1.9, p=0.07
	Insecure	23	5.5	
Protein Buffering	Secure	18	-95.8	t= -1.5, p=0.2
	Insecure	23	-53.8	

Discussion

In this study, dietary adequacies were examined for mothers and children in León, Nicaragua, and then further analyzed in 1) urban versus rural contexts, and 2) food secure versus food insecure contexts. The average dietary adequacies of women and children overall showed that women received 80.1% of their energy adequacy while children received 90.1% (ages 3-6) and 87.7% (ages 7-11) of their energy adequacy. We see therefore that children receive better dietary intakes and significantly better protein intakes.

In the context of Nicaragua, staple crops are highly prized and essential food items in the home. For example, corn is a highly used food source as it is a staple crop. It is used in multiple dishes, and is used in the creation and consumption of *tortillas*. Beans, too, are grown in the region, and are used as the main source of protein. Non-native crops, such as rice, and imported food products have also gained significance for cheap sources of carbohydrates, such as processed snack foods. Fruits and vegetables are consumed seasonally. Unfortunately, these food products are neither as affordable nor as readily available as staple foods. Being able to supply sufficient calories for the family is a major tenet of household culture in Nicaragua. It is why food insecurity has such a detrimental effect upon women and children in Nicaraguan society.

Urban versus Rural Dietary Adequacies

Modernization and industrialization has played a large role in affecting and changing the nutrient intakes of cultural groups all over the world. Studies have shown women tend to become the most targeted populations in regards to food security when dietary adequacies change with the advent of modernization (Bindon, 1984), in that they receive lower nutritional quality foods. In the case of Nicaragua, modernization has greatly affected the types of foods that are

consumed. With the advent of globalization, processed foods are considered markers of wealth. In this sample, while households were poor, the consumption of processed foods was common (such as snack foods, street food), regardless of environmental or food security context.

It has also been documented that urban and rural contexts tend to have different dietary environments. Oftentimes, these differences manifest themselves as increased or decreased intakes of foods or increased consumption of processed foods by urban populations (Witcher et. al., 1988; Nakatsuka et. al., 1988). There are disparities in consumption of such foods in rural versus urban contexts. In rural contexts, studies show that processed foods are not as consumed, and that foods such as staple grains, meat, and other animal products are consumed more frequently (Gittelsohn, 1997; Witcher et al., 1988). In León, the most common foods consumed in the home were rice, beans, *gallo pinto* (a mixture of refried beans and rice, usually consumed at breakfast or dinner), viscera/other types of meats,, corn tortillas, coffee, processed foods (Coca-Cola, Tang, cookies, other snacks), and sweetened fruit beverages (*refrescos*). These observations are important to note in the contexts of urban versus rural contexts, in that the urban center has become highly modernized with access to processed foods. Both mothers and their children were better able to meet their protein than their energy needs in urban contexts in León. Children also received very high protein intakes. This is supported by the literature, which often reports children having far better protein intakes than that of their mothers (Piperata, et al., 2013; Kaiser and Dewey, 1991). In this context, children and women alike may be receiving adequate amounts of protein due to local dietary preferences which emphasized the consumption of *frijoles* (beans), milk, cheeses, and meat. Generally, animal-based products are highly valued in Nicaraguan culture and were readily available in the market. While these types of products are readily available in the urban center, these animal products may not be as commonly found in

rural contexts as other cheaper sources of protein (ex. *frijoles*). Prime cuts of meat were expensive and rarely consumed in these poor households. However, less valued animal parts, including organ meats, were both affordable for most families. Even though the cultural value of organ meats is lower, their protein content is equivalent which might explain the high protein adequacies we observed.

Food Insecure versus Food Secure Dietary Adequacies

In looking at urban versus rural contexts, it was interesting to note that more urban households identified as moderate to food insecure (61%) versus those households that identified as food secure (39%). While this could be due to the fact that this sample is smaller than the rural population, it may also be the case because rural environments may be able to produce food or maintain nutritive resources better than urban contexts. Perception of food insecurity also plays a large role in understanding food insecurity in these households, since food insecurity is often reported as the household experience with food scarcity (Migotto et al., 2006). Because urban contexts may have more food resources available, those households that are in poverty may consider themselves more food insecure in relation to the abundances of their environment.

With my first question of food security and dietary adequacies, it was found that mothers showed better energy adequacies in food insecure environments, whereas children showed better energy and protein adequacies in food secure environments. It was hypothesized that energy and protein intakes would be significantly better in food secure contexts than in food insecure contexts, due to the increased amount of household resources present in food secure homes over food insecure homes. Protein adequacies were not significantly different between mothers in food secure versus food insecure households. One possible explanation for how mothers received

more adequate diets in food insecure households could be that mothers were consuming more food outside the home (e.g., at work) leading to their more adequate intakes. Many of the women in this study who reported themselves as food insecure worked in the *maquiladora* factories in the *Zona Franca* (free trade zone) where they commonly received food during working hours. Wages paid in the *Zona Franca* are very low, and are considered enough for a mother to furnish basic nutrition for her family. Studies have discussed the situation women face when working in the *maquiladoras* in the free trade zone, and particular attention has been directed towards the question of food security. Many of the women who work in these factories claimed that the salary did not allow them to secure adequate nutrition for their children and families, and that the wages received were not sufficient enough to achieve food security (Fehling, 2013). This prevents mothers from being able to secure adequate energy and protein for their children due to their socioeconomic status. Even though the women themselves receive meals at work, they are not paid enough for their labor to achieve food security statuses in the household.

The better intakes observed among children in food secure households are more easily explained. Based on my original prediction, households reporting food security likely had greater resources which were made available to growing children at mealtimes. On the whole, children's energy and protein intakes tended to be more adequate than their mothers' energy and protein intakes. It is hypothesized that the reasoning for why mothers receive worse energy and protein adequacies is that they may be perceived as individuals not necessarily deserving of as much food. One study (Gittelsohn, 1997), illustrated that different foods were either encouraged or discouraged for different groups, and that especially for women and children, different quantities of foods were discouraged. For women especially, foods rich in micronutrients or protein were discouraged from consumption, and foods high in carbohydrates were encouraged (Gittelsohn,

1997). Gender is another factor that plays an important role in food security with children. Studies have shown that better energy adequacies are seen in male members of the household over women, especially in context of cultures which highly value men socially over women (Gittelsohn, 1997). In the context of León, it is possible that certain foods were diverted to different family members other than women and children, or boys and girls were fed different quantities of foods. In this analysis, gender did not play a large role in the dietary and protein adequacies of children, but it would be interesting in future analysis to look at gender disparities alongside different environmental and socioeconomic contexts.

However, even with sufficient protein and energy intake, children could still be facing the effects of food insecurity. Studies have shown that even with proper energy and protein intakes, children can still be affected by food insecurity (Bernal et. al., 2012; Fram et al., 2011). Family members may report that they are protecting children from nutritional deficiency even though age and gender discrimination with intrahousehold distribution of food may still negatively affect children's nutritional intake (Fikree and Pasha, 2004; Frongillo and Begin, 1993). Children in León therefore may experience food insecurity in different contexts besides from dietary adequacy.

Maternal Dietary Buffering in Food Insecure versus Food Secure Households

The hypothesis that greater maternal nutritional buffering would be observed in food insecure households is rejected, as it was found that a greater degree of buffering occurred in food secure households. One explanation for this finding might be that in food insecure homes, there simply was not enough food available to allow mothers to divert more resources to their children without her having little to nothing to eat themselves. As part of this study we collected

data on total household food availability on the same days the dietary intakes of these mothers and children were collected. In this study, household dietary data was not used to analyze maternal dietary buffering, but it is possible to use these household data to further explore this question in the future. Alternatively, this may be due to the fact that mothers are securing more of their food outside the home (at work). As children are not present when mothers are served food at their jobs, there would be limited opportunities for mothers to share these foods with their children. Mothers, however, still may face pressures to buffer their children, especially younger children, since younger children are highly dependent on mothers for resources (Graham, 1997). Even though all the households examined in this thesis are of a low socioeconomic status, mothers in food secure households may still feel a cultural pressure to offset hunger in their children, despite having enough alimentary resources.

Maternal buffering was shown to be statistically significant in terms of protein, but not with energy buffering. As stated above, protein sources are highly valued in Nicaraguan culture; therefore mothers view protein to be a needed food source for their children. This is shown by the highly prevalent occurrence of protein buffering occurring in all (n=41) households. It is hypothesized that energy buffering may occur in greater frequency in different social networks. It was common for foods to be gifted by neighbors to help buffer other households during times of increased food scarcity. Studies illustrate this relationship, such as one study in Colombia, where it was seen that impoverished women in urban Cali often would rely on kin for food or resources to procure food or purchase food on credit (Dufour, 1997). It was noted that while these strategies were used to provide sufficient energy and protein amounts in the short term, these strategies could be costly for the household (Dufour, 1997). While the significance of the reliance on neighbors/kin was not quantitatively measured in our study, this type of coping

method is highly interesting and would be beneficial to focus on in future studies of coping methods with food insecurity in Nicaragua.

Limitations

Several study limitations need to be considered in examining these results. First, because we only included one child in our data analysis, it is unclear if mothers equally buffer all children. Studies have shown that mothers may be expected to preferentially buffer younger children (Graham, 1997), and studies examining Amazonian women and children pairs reported both quantitative and ethnographic data illustrating increased buffering with younger children (Piperata et. al., 2013). It would be beneficial in future studies to examine maternal nutritional buffering amongst siblings and other family members to further understand the extent to which buffering occurs.

Second, because the nutritional data is based on recall and estimation of weights of Nicaraguan foods, rather than actual weights of foods consumed by the subjects, the quantities consumed are estimates of what individuals in the household consumed. However, it is acknowledged that in order to obtain a more precise measure of food intake, a longer time period for the study would need to occur, as well as a greater depth of presence of the researcher in the homes of the subjects.

Third, because an average PAL score was used for women and children to calculate their TDEE and adequacy measurements, variation amongst activity in different environmental contexts is not known. Children in rural contexts tend to have higher physical activity levels compared to their urban counterparts; however, this also varies according to household dependence on subsistence activities, transportation sources, etc. that can affect physical activity.

Further Inquiry

This study reports rare data on the dietary adequacies of mothers and children in a setting of high poverty and food insecurity. Future studies should be conducted to examine the effects of food insecurity on the intakes of other household members (male head or father, older siblings), as well as their potential role in buffering young children from resource scarcities. There is very little research focused on men's roles upon the growth and development of children, and it would add to the literature on food insecurity by focusing on the coping experiences of men and their kin. In regards to Latin America, it would be highly interesting to see whether parental dietary buffering occurs, and how this mechanism would be affected by the *machismo* culture. It will also be important to identify other coping strategies that may be used to offset hunger and malnutrition in poor households in both Nicaragua, and in other Central American countries, including the role of kin relations and social support networks.

Acknowledgements

First, I would like to thank Barbara Piperata for allowing me the opportunity to conduct a thesis on this work and help collect data in Nicaragua for this paper. I would specifically like to thank the reviewing committee of the Social and Behavioral Sciences Scholarship for their generous award in February, 2013 to help fund my research in Nicaragua. I would also like to thank the Universidad Autonoma de Nicaragua (UNAN) and the Centro de Investigacion de Demographia y Salud (CIDS) for partnering with The Ohio State University to execute this project, and for providing the researchers with demographic data of Leon. I thank the researchers at CIDS, and the support staff for their help in data collection and fieldwork support. Finally, I would like to thank the women and children of urban and rural Leon for their patience and willingness to participate to this research project.

Appendix A: Dietary Recall Forms

FECHA	ID # Madre	Encuesta No
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UNIVERSIDAD NACIONAL AUTONOMA DE NICARAGUA

UNAN – LEÓN

Facultad de Ciencias Médicas

Centro de Investigación en Demografía y Salud

(CIDS UNAN - León)

THE OHIO STATE UNIVERSITY

Estudio de Seguridad Alimentaria y Salud (ESAS-NICA)

Etapas 2

DIA #1

**Consentimiento, Datos línea de base, 24 horas de recolección,
Antropometría**

Consentimiento

Datos línea de base

***LLENAR ID DE LA MADRE Y NÚMERO DE ENCUESTA ARRIBA Y EN LAS
CARATULAS CUANDO RECIBE EL PAQUETE***

LLENAR LA FECHA EN EL DÍA QUE RECOJA LA INFORMACIÓN
(distinto para cada día en la casa)

CONSENTIMIENTO INFORMADO

LEER SIEMPRE

Hola mi nombre es _____. Trabajo para la UNAN León. Un miembro de nuestro equipo la visitó el año pasado y ahora estamos aquí para hacer un estudio de seguimiento para entender mejor el estado nutricional de los hogares en comunidades rurales y urbanas de León. Nos interesa conocer como factores del hogar afectan la cantidad y el tipo de comida en la casa así como la salud de las mujeres y los niños. Su participación en el estudio es voluntaria y toda la información recolectada en este estudio será confidencial.

Si usted acepta participar en este estudio, yo le preguntaré sobre quien vive en la casa, lo que la familia come y como hacen para conseguir la comida. También les preguntaré sobre temas sensibles como por ejemplo, si ha tenido problemas para alimentar a sus niños, si se ha sentido triste, si ha sentido que no puede hacer su trabajo diario. Después de hacerle estas preguntas, les tomaremos unas medidas a usted y los otros miembros de su familia. Estas incluirán su peso y su talla. También le preguntaremos sobre la comida preparada en su hogar y las comidas que usted y su hijo consumieron. Para recolectar esta información necesitaremos regresar a visitarla mañana y pasado mañana. Para agradecerle su participación en el estudio usted recibirá una pequeña canasta de básica y su hijo recibirá un regalito.

La participación en la entrevista HOY durará aproximadamente 2 horas. La visita de mañana y la de pasado mañana durarán aproximadamente una hora.

¿Tiene alguna pregunta?

¿Está de acuerdo en participar?

SI

NO

FECHA

ID # Madre

Encuesta No



UNIVERSIDAD NACIONAL AUTONOMA DE NICARAGUA

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(CIDS UNAN - León)

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Estudio de Seguridad Alimentaria y Salud (ESAS-NICA)

Etapas 2

DIA #1

**Consentimiento, Datos línea de base, 24 horas de recolección,
Antropometría**

24 horas de recolección: Casa, Madre, Hijo/a focal

***LLENAR ID DE LA MADRE Y NÚMERO DE ENCUESTA ARRIBA Y EN LAS CARATULAS
CUANDO RECIBE EL PAQUETE***

**LLENAR LA FECHA EN EL DÍA QUE RECOJA LA INFORMACIÓN
(distinto para cada día en la casa)**

CASA- Recordatorio de 24 horas dietético

Nombre de la madre _____ ID de la madre _____ (VER HOJA ROSTRO DEL HOGAR)

CASA – HOJA DESAYUNO

¿Quién fue la persona principal que sirvió la comida? _____ (Nombre)

Me gustaría hablar con Ud. sobre todas las comidas y bebidas que Ud. preparó y sirvió para su familia durante las últimas 24 horas ayer. Hablamos primero del desayuno – **¿Me puede decir lo que preparó para desayuno ayer?**

Desayuno			
Para las comidas y bebidas simples (pan): Listar cada uno por cada fila. Para las comidas y bebidas preparadas (gallo pinto, café): Poner el nombre de la comida/bebida al lado del número y listar todos los ingredientes en la receta debajo del nombre	¿Y cuánto de [<i>comida 1.</i>] usó? Cada ítem debe tener su propio cantidad medida como # de cucharas, # de pedazos, o # de tazas.	Porción consumido	Número de la Receta
1.	1.		
2.	2.		

3.	3.		
4.	4.		

Desayuno (CONTINUADO)			
<p>Para las comidas y bebidas simples (pan): Listar cada uno por cada fila.</p> <p>Para las comidas y bebidas preparadas (gallo pinto, café): Poner el nombre de la comida/bebida al lado del número y listar todos los ingredientes en la receta debajo del nombre</p>	<p>¿Y cuánto de [<i>comida 1.</i>] usó?</p> <p>Cada ítem debe tener su propio cantidad medida como # de cucharas, # de pedazos, o # de tazas.</p>	Porción consumido	Número de la Receta
5.	5.		

6.	6.		
7.	7.		
8.	8.		

¿Algo más que preparó para *desayuno* ayer? [Si dice si, agregarlo al cuadro arriba y regresar a preguntar esto hasta que diga que no.

¿Quiénes desayunaron en la casa ayer?	Sexo M/F	Edad

CASA – HOJA ALMUERZO

¿Quién fue la persona principal que sirvió la comida? _____ (Nombre)

¿Me puede decir lo que preparó para almuerzo ayer?

Almuerzo			
Para las comidas y bebidas simples (pan): Listar cada uno por cada fila. Para las comidas y bebidas preparadas (gallo pinto, café): Poner el nombre de la comida/bebida al lado del número y listar todos los ingredientes en la receta debajo del nombre	¿Y cuánto de [<i>comida 1.</i>] usó? Cada ítem debe tener su propio cantidad medida como # de cucharas, # de pedazos, o # de tazas.	Porción consumido	Número de la Receta
1.	1.		

2.	2.		
3.	3.		
4.	4.		

Almuerzo (CONTINUADO)			
Para las comidas y bebidas simples (pan): Listar cada uno por cada fila. Para las comidas y bebidas preparadas (gallo pinto, café): Poner el nombre de la comida/bebida al lado del número y listar todos los ingredientes en la receta debajo del nombre	¿Y cuánto de [<i>comida 1.</i>] usó? Cada ítem debe tener su propio cantidad medida como # de cucharas, # de pedazos, o # de tazas.	Porción consumido	Número de la Receta
5.	5.		
6.	6.		
7.	7.		
8.	8.		

--	--	--	--

¿Algo más que preparó para *almuerzo* ayer? [Si dice si, agregarlo al cuadro arriba y regresar a preguntar esto hasta que diga que no.]

¿Quiénes almorzaron en la casa ayer?	Sexo M/F	Edad

CASA – HOJA CENA

¿Quién fue la persona principal que sirvió la comida? _____ (Nombre)

¿Me puede decir lo que preparó para CENA ayer?

CENA			
Para las comidas y bebidas simples (pan): Listar cada uno por cada fila. Para las comidas y bebidas preparadas (gallo pinto, café): Poner el nombre de la comida/bebida al lado del número y listar todos los ingredientes en la receta debajo del nombre	¿Y cuánto de [comida 1.] usó? Cada ítem debe tener su propio cantidad medida como # de cucharas, # de pedazos, o # de tazas.	Porción consumido	Número de la Receta
1.	1.		
2.	2.		

3.	3.		
4.	4.		

CENA (CONTINUADO)			
<p>Para las comidas y bebidas simples (pan): Listar cada uno por cada fila.</p> <p>Para las comidas y bebidas preparadas (gallo pinto, café): Poner el nombre de la comida/bebida al lado del número y listar todos los ingredientes en la receta debajo del nombre</p>	<p>¿Y cuánto de [<i>comida 1.</i>] usó?</p> <p>Cada ítem debe tener su propio cantidad medida como # de cucharas, # de pedazos, o # de tazas.</p>	Porción consumido	Número de la Receta
5.	5.		

6.	6.		
7.	7.		
8.	8.		

¿Algo más que preparó para *cena* ayer? [Si dice si, agregarlo al cuadro arriba y regresar a preguntar esto hasta que diga que no.]

¿Quiénes cenaron en la casa ayer?	Sexo M/F	Edad

CASA – HOJA COMIDA EXTRA

¿Después del desayuno y antes del almuerzo, alguien de la familia consumió algún alimento o bebió algo, incluyendo a Ud.? Por ejemplo café, pan dulce, fruta, rosquillas, galletas, meneitos, bolis...

SI -- Llenar qué comida Y quienes en las tablas

NO --- próxima pregunta

COMIDA EXTRA -			
Para las comidas y bebidas simples (pan): Listar cada uno por cada fila. Para las comidas y bebidas preparadas (gallo pinto, café): Poner el nombre de la comida/bebida al lado del número y listar todos los ingredientes en la receta debajo del nombre	¿Y cuánto de [<i>comida 1.</i>] usó? Cada ítem debe tener su propio cantidad medida como # de cucharas, # de pedazos, o # de tazas.	Porción consumido	Número de la Receta
1.	1.		

2.	2.		
3.	3.		
4.	4.		

¿Quiénes?	Sexo M/F	Edad

¿Después del almuerzo y antes de la cena, alguien de la familia consumió algún alimento o bebió algo, incluyendo a Ud.? Por ejemplo café, pan dulce, fruta, rosquillas, galletas, meneitos, bolis...

SI -- Llenar qué comida Y quienes en las tablas

NO --- próxima pregunta

CASA COMIDA EXTRA -			
Para las comidas y bebidas simples (pan): Listar cada uno por cada fila. Para las comidas y bebidas preparadas (gallo pinto, café): Poner el nombre de la comida/bebida al lado del número y listar todos los ingredientes en la receta debajo del nombre	¿Y cuánto de [comida 1.] usó? Cada ítem debe tener su propio cantidad medida como # de cucharas, # de pedazos, o # de tazas.	Porción consumido	Número de la Receta
1.	1.		
2.	2.		
3.	3.		

4.	4.		

¿Quiénes?	Sexo M/F	Edad

¿Después de la cena y antes de acostarse, alguien de la familia consumió algún alimento o bebió algo, incluyendo a Ud.? Por ejemplo café, pan dulce, fruta, rosquillas, galletas, meneitos, bolis...

SI -- Llenar qué comida Y quienes en las tablas

NO --- próxima pregunta

CASA COMIDA EXTRA -			
Para las comidas y bebidas simples (pan): Listar cada uno por cada fila. Para las comidas y bebidas preparadas (gallo pinto, café): Poner el nombre de la comida/bebida al lado del número y listar todos los ingredientes en la receta debajo del nombre	¿Y cuánto de [<i>comida 1.</i>] usó? Cada ítem debe tener su propio cantidad medida como # de cucharas, # de pedazos, o # de tazas.	Porción consumido	Número de la Receta
1.	1.		
2.	2.		
3.	3.		

4.	4.		

¿Quiénes?	Sexo M/F	Edad

MADRE - Recordatorio de 24 horas dietético

Nombre de la madre _____ ID de la madre _____ (VER HOJA ROSTRO DEL HOGAR)

MADRE – HOJA DESAYUNO

Me gustaria hablar con Ud. sobre la comida y bebida que Ud. ha tomado durante los últimos 24 horas ayer. Hablamos primero de la primera vez que comió en la mañana ayer, su **desayuno** -

Desayuno		
¿Me puede decir lo que comió y bebió por su desayuno ayer? Listar cada comida/bebida/receta (uno por cada fila). (Por ejemplo: gallo pinto, café, pan dulce, cuajada)	¿Y cuánto de [comida 1.] comió? Cada ítem debe tener su propio cantidad medida como # de cucharas, # de pedazos, o # de tazas (bebidas).	Número de la Receta
1.	1.	

2.	2.	
3.	3.	
4.	4.	
5.	5.	
6.	6.	
7.	7.	

MADRE – HOJA ALMUERZO

Hablamos de su **almuerzo** ayer....

Almuerzo		
¿Me puede decir lo que comió y bebió por su almuerzo ayer? Listar cada comida/bebida/receta (uno por cada fila). (Por ejemplo: gallo pinto, café, pan dulce, cuajada)	¿Y cuánto de [comida 1.] comió? Cada ítem debe tener su propio cantidad medida como # de cucharas, # de pedazos, o # de tazas (bebidas).	Número de la Receta
1.	1.	
2.	2.	
3.	3.	
4.	4.	

5.	5.	
6.	6.	
7.	7.	
8.	8.	

MADRE – HOJA CENA

Hablamos de su **cena** ayer....

Cena		
¿Me puede decir lo que comió y bebió por su cena ayer? Listar cada comida/bebida/receta (uno por cada fila). (Por ejemplo: gallo pinto, café, pan dulce, cuajada)	¿Y cuánto de [comida 1.] comió? Cada ítem debe tener su propio cantidad medida como # de cucharas, # de pedazos, o # de tazas (bebidas).	Número de la Receta
1.	1.	
2.	2.	
3.	3.	
4.	4.	

5.	5.	
6.	6.	
7.	7.	
8.	8.	

MADRE – HOJA COMIDA EXTRA

¿Después del desayuno y antes del almuerzo, Ud. consumió algún alimento o bebió algo? Por ejemplo café, pan dulce, fruta, rosquillas, galletas, meneitos, bolis...

SI -- Llenar qué comida (TABLA FINAL, próxima página)

NO --- próxima pregunta

¿Después del almuerzo y antes de la cena, Ud. consumió algún alimento o bebió algo? Por ejemplo café, pan dulce, fruta, rosquillas, galletas, meneitos, bolis...

SI -- Llenar qué comida (TABLA FINAL, próxima página)

NO --- próxima pregunta

¿Después de la cena y antes de acostarse, Ud. consumió algún alimento o bebió algo? Por ejemplo café, pan dulce, fruta, rosquillas, galletas, meneitos, bolis...

SI -- Llenar qué comida (TABLA FINAL, próxima página)

NO --- ¡está terminado!

MADRE – HOJA COMIDA EXTRA

<p>Listar cada comida/bebida/receta (uno por cada fila).</p> <p>(Por ejemplo: gallo pinto, café, pan dulce, cuajada)</p>	<p>¿Y cuánto de [comida 1.] comió?</p> <p>Cada ítem debe tener su propio cantidad medida como # de cucharas, # de pedazos, o # de tazas (bebidas).</p>	<p>Número de la Receta</p>
1.	1.	
2.	2.	
3.	3.	
4.	4.	
5.	5.	

6.	6.	
7.	7.	
8.	8.	

HIJO/A - Recordatorio de 24 horas dietético

Nombre de la madre _____ ID de la madre _____ (VER HOJA ROSTRO DEL HOGAR)

Nombre del hijo/a _____

HIJO/A – HOJA DESAYUNO

Me gustaria hablar con Ud. sobre la comida y bebida que su hijo/a (nombre) ha tomado durante los últimos 24 horas ayer. Hablamos primero de la primera vez que el/ella comió en la mañana ayer, su **desayuno** -

Desayuno		
¿Me puede decir lo que comió y bebió su hijo/a por su desayuno ayer? Listar cada comida/bebida/receta (uno por cada fila). (Por ejemplo: gallo pinto, café, pan dulce, cuajada)	¿Y cuánto de [comida 1.] comió? Cada ítem debe tener su propio cantidad medida como # de cucharas, # de pedazos, o # de tazas (bebidas).	Número de la Receta
1.	1.	
2.	2.	
3.	3.	

4.	4.	
5.	5.	
6.	6.	
7.	7.	

HIJO/A – HOJA ALMUERZO

Hablamos del **almuerzo** de su hijo/a (nombre) ayer....

Almuerzo		
¿Me puede decir lo que comió y bebió su hijo/a por su almuerzo ayer?	¿Y cuánto de [<i>comida 1.</i>] comió?	Número de la

Listar cada comida/bebida/receta (uno por cada fila). (Por ejemplo: gallo pinto, café, pan dulce, cuajada)	Cada ítem debe tener su propio cantidad medida como # de cucharas, # de pedazos, o # de tazas (bebidas).	Receta
1.	1.	
2.	2.	
3.	3.	
4.	4.	
5.	5.	
6.	6.	

7.	7.	
8.	8.	

HIJO/A – HOJA CENA

Hablamos de la **cena** de su hijo/a (nombre) ayer....

Cena		
¿Me puede decir lo que comió y bebió su hijo/a por su cena ayer? Listar cada comida/bebida/receta (uno por cada fila). (Por ejemplo: gallo pinto, café, pan dulce, cuajada)	¿Y cuánto de [comida 1.] comió? Cada ítem debe tener su propio cantidad medida como # de cucharas, # de pedazos, o # de tazas (bebidas).	Número de la Receta
1.	1.	

2.	2.	
3.	3.	
4.	4.	
5.	5.	
6.	6.	
7.	7.	
8.	8.	

--	--	--

HIJO/A – HOJA COMIDA EXTRA

¿Después del desayuno y antes del almuerzo, su hijo/a (nombre) consumió algún alimento o bebió algo? Por ejemplo café, pan dulce, fruta, rosquillas, galletas, meneitos, bolis...

SI -- Llenar qué comida (TABLA FINAL, próxima página)

NO --- próxima pregunta

¿Después del almuerzo y antes de la cena, su hijo/a (nombre) consumió algún alimento o bebió algo? Por ejemplo café, pan dulce, fruta, rosquillas, galletas, meneitos, bolis...

SI -- Llenar qué comida (TABLA FINAL, próxima página)

NO --- próxima pregunta

¿Después de la cena y antes de acostarse, su hijo/a (nombre) consumió algún alimento o bebió algo? Por ejemplo café, pan dulce, fruta, rosquillas, galletas, meneitos, bolis...

SI -- Llenar qué comida (TABLA FINAL, próxima página)

NO --- ¡está terminado!

HIJO/A – HOJA COMIDA EXTRA

<p>Listar cada comida/bebida/receta (uno por cada fila).</p> <p>(Por ejemplo: gallo pinto, café, pan dulce, cuajada)</p>	<p>¿Y cuánto de [comida 1.] comió?</p> <p>Cada ítem debe tener su propio cantidad medida como # de cucharas, # de pedazos, o # de tazas (bebidas).</p>	<p>Número de la Receta</p>
1.	1.	
2.	2.	
3.	3.	
4.	4.	
5.	5.	

6.	6.	
7.	7.	
8.	8.	

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